Mutagenic Evaluation of Compound FDA 73-77 (**Magnesium Oxide USP Heavy, Powder**) 4/30/75

BIONETICS
Litton

LBI PROJECT # 2468

MUTAGENIC EVALUATION OF 6CM87

COMPOUND 001309484

MAGNESIUM OXIDE

USP HEAVY, POWDER

(73-77)

SUBMITTED TO

FOOD AND DRUG ADMINISTRATION
DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
ROCKVILLE, MARYLAND

SUBMITTED BY

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EVALUATION SUMMARY

Compound 001309484, Magnesium Oxide, appeared to produce increased reversion of strain TA-1538 in the presence of primate liver tissue. No other tests with this chemical were positive. The positive results were relatively weak and may represent normal background fluctuations.

Because of the apparent genetic activity in the primate activation tests, the compound cannot be considered clearly nonmutagenic.

DATE: 04/30/75

SPONSOR: Food and Drug Administration, Contract Number 223-74-2104

SUBJECT: Evaluation of Test Compound Magnesium Oxide USP Heavy, powder

I. OBJECTIVE

The objective of this study was to evaluate the test compound for genetic activity in microbial assays with and without the addition of mammalian metabolic activation preparations.

II. MATERIALS

A. Test Compound

1. Date Received: August, 1974

2. Description: Fine white powder

B. Indicator Microorganisms

The following strains of indicator microorganisms were used in the evaluation:

Yeast Strain: *Saccharomyces cerevisiae*, strain D4

Bacteria Strains: *Salmonella typhimurium*, strains: TA-1535
TA-1537
TA-1538

C. Reaction Mixture

The following reaction mixture was employed in the activation tests:

Component	Final Concentration/ml
1. TPN (sodium salt)	6 μ M
2. Isocitric acid	49 μ M
3. Tris buffer, pH 7.4	28 μ M
4. $MgCl_2$	1.7 μ M
5. Tissue homogenate fraction	72 mg

D. Tissue Homogenates and Supernatant

The tissue homogenates and 9,000 x g supernatants were prepared from tissues of the following mammalian species: Mouse-ICR random bred adult males; rat-Sprague-Dawley adult males; and primate-*Macaca mulatta* adult males.

E. Positive Control Compounds

Table 1 lists chemicals for positive controls in the direct and activation assays.

TABLE 1

POSITIVE CONTROLS USED IN DIRECT AND ACTIVATION ASSAYS

Assay	Chemical[a]	Solvent	Probable Mutagenic Specificity
Non-activation	Ethyl methanesulfonate	Water or saline	BPS
	2-Nitrofluorene	Dimethylsulfoxide[c]	FS
	Quinacrine mustard	Water or saline	FS
Activation	Dimethylnitrosamine	Water or saline	BPS
	2-Acetylaminofluorene	Dimethylsulfoxide[c]	FS

[a] Concentrations given in the Results Section
[b] BPS = base-pair substitution; FS = frameshift
[c] Previously shown to be non-mutagenic

III. METHODS

A. Toxicity

The solubility, toxicity and doses for all chemicals were determined prior to screening.

Each chemical was tested for survival against the specific indicator strains over a range of doses to determine the 50% survival dose. Bacteria were tested in phosphate buffer, pH 7.4, for one hour at 37°C on a shaker. Yeasts were tested in phosphate buffer, pH 7.4, for four hours at 30°C on a shaker. The 50% survival curve and the 1/4 and 1/2 50% doses calculated.

If no toxicity was obtained for a chemical with a given strain, then a maximum dose of 5% (w/v) was used against the strain.

Unless otherwise specified, the doses calculated for the tests in buffer were applied to the activation tests. The solubility of the test chemical under treatment conditions is stated in the Results Section.

B. Plate Tests

In the nonactivation procedure, approximately 10^9 cells of a log-phase culture of the bacterial indicator strains were spread over the surface of a minimal plate, and a measured amount of the test chemical was placed in the center of the test plate. In activation tests, the test chemical was added to the cells, and an aliquot of the mixture was spread on the surface of the test plate. The reaction mixture (0.1 ml) plus tissue extract was then spotted on the surface of the plate. Positive and solvent controls were included. All plates were incubated at 37°C for four days and then scored. Each compound (test, positive control and solvent control) was done in duplicate. Concentrations of the positive control compounds are listed in the Results Section.

C. Suspension Tests

1. Non activation

Log-phase bacteria and stationary-phase yeast cultures of the indicator organisms were grown in complete broth, washed and resuspended in 0.9% saline to densities of 1×10^9 cells/ml and 5×10^7 cells/ml, respectively. This constituted the working stock for tests of a group of test chemicals and their respective controls. Tests were conducted in plastic tissue culture plates. Cells plus appropriate volume(s) of the test chemical were added to the wells to give a final volume of 1.5 ml. The solvent replaced the test chemical in the negative controls. Treatment was at 30°C for four hours for yeast tests and at 37°C for one hour for bacterial tests. All flasks were shaken during treatment. Following treatment, the plates were set on ice. Aliquots of cells were removed, diluted in sterile saline (4°C) and plated on the appropriate complete media. Undiluted samples from flasks containing the bacteria were plated on minimal selective medium in reversion experiments. Samples from a 10^{-1} dilution of treated cells were plated on the selected media for enumeration of gene conversion with strain D4. Bacterial plates were scored after incubation for 48 hours at 37°C. The yeast plates were incubated at 30°C for 3-5 days before scoring.

2. Activation

Bacteria and yeast cells were grown and prepared as described in the non activation tests. Measured amounts of the test and control chemicals plus 0.25 ml of the stock-cell suspension were added to wells of the Linbro plate containing the appropriate tissue fraction and reaction mixture. All flasks (bacteria and yeast) were incubated at 37°C in an oxygen atmosphere with shaking. The treatment times as well as the dilutions, plating procedures and scoring of the plates were the same as described for non activation tests.

D. Preparation of Tissue Homogenates and 9,000 x g Cell Fractions

Male animals (sufficient to provide the necessary quantities tissues) were killed by cranial blow, decapitated and bled. Organs were immediately dissected from the animal using aseptic techniques and placed in ice-cold 0.25 M sucrose buffered with Tris at pH of 7.4. Upon collection of the desired quantity of organs, they were washed twice with fresh buffered sucrose and completely homogenized with a motor-driven homogenizing unit at 4°C. The whole organ homogenate obtained from this step was divided into two samples. One sample was frozen at -80°C and the other was centrifuged for 20 minutes at 9,000 x g in a refrigerated centrifuge. The supernatant from the centrifuged sample was retained and frozen at -80°C. These two frozen samples were used for the activation studies.

E. Data Recording and Reporting

Following the specified incubation periods all population plates were scored by an automatic colony counter and the results from each plate of a set were recorded, in ink, on data processing forms. All minimal or other types of selective media plates were hand scored and the results recorded along with the respective population data. Other relevant experimental data were recorded on experimental definition forms. For bacteria strains the number of colonies recorded from either the population or selective plates represents that number in 1 ml of test suspension plated. The numbers recorded for the yeast strain D4 represent the number in 0.5 ml of test suspension plated. Data was then processed and printed from a computer program.

IV. RESULTS SECTION

A. Solubility Properties of the Test Compound

1. Name or code designation of the test compound:
001309484, Magnesium Oxide USP Heavy, powder

2. Test solvent: Saline

3. Solubility of the test compound under treatment conditions:
Soluble under treatment conditions.

4. Additional comments: Fine white powder

B. Toxicity and Dosage Determinations for the Test Compound
001309484

1. Test date for toxicity determination: 01/28/75

2. The 50% survival level was determined for bacteria and yeast indicator organisms by conducting survival curves with the test compound at the following concentrations:

Percent Concentration (w/v or v/v)

5.0
0.5
0.05
0.005
0.0005

3. Concentrations of the test compound used in the mutagenicity tests:

Dose	Percent Concentration	
	Bacteria	Yeast
1/4 50% Survival	0.025	2.5
1/2 50% Survival	0.05	5.0
50% Survival	0.10	10.0
Plate Tests	0.05	--

IV. SUMMARY OF TEST RESULTS

Plate Tests

A. Name or code designation of the test compound: 001309484

B. Test date: 02/14/75

C. Concentration of the test compound: 0.05%

Test	Species	Tissue	TA-1535		TA-1537		TA-1538	
			1	2	1	2	1	2
1. Non-activation								
Solvent Control	---	---	47	78	11	14	26	6
Positive Control[a]	---	---	$>10^3$	$>10^3$	209	301	147	140
Test Compound	---	---	73	41	20	13	7	7
2. Activation								
Negative Control	---	---	40	90	14	22	14	4
Solvent Control	---	---	27	89	10	33	17	18
Reaction Mixture Control	---	---	47	31	12	34	20	22
Positive Control[b]	Mouse	Liver	>500	>500	83	75	>200	>200
Positive Control		Lung	59	59	10	7	20	10
Positive Control		Testes	42	60	11	10	11	10
Positive Control	Rat	Liver	>300	>300	83	86	$>10^2$	$>10^2$
Positive Control		Lung	63	77	10	7	19	9
Positive Control		Testes	44	61	10	8	12	9
Positive Control	Monkey	Liver	>100	>100	41	34	>100	93
Positive Control		Lung	71	54	9	8	20	6
Positive Control		Testes	47	61	10	9	13	10
Test Compound	Mouse	Liver	31	36	1	1	4	1
Test Compound		Lung	30	39	1	2	3	0
Test Compound		Testes	34	47	5	2	4	2
Test Compound	Rat	Liver	25	32	0	2	0	1
Test Compound		Lung	26	38	1	3	3	0
Test Compound		Testes	28	44	3	2	4	2
Test Compound	Monkey	Liver	28	34	0	2	3	4
Test Compound		Lung	26	36	1	2	5	1
Test Compound		Testes	30	50	3	3	3	4

a TA-1535 EMS 10 µl/plate
TA-1537 QM 20 µg/plate
TA-1538 NF 100 µg/plate

b TA-1535 DMNA 50 µm/plate
TA-1537 AAF 100 µg/plate
TA-1538 AAF 100 µg/plate

DATA TABLE TERMS AND ABBREVIATIONS

ABBREVIATION OR TERM	DEFINITION OR EXPLANATION
COMPOUND	Client designated compound number appears in this column.
TEST CODES	NAN = Non Activation: Solvent Control NAP = Non Activation: Positive Control NA1 = Non Activation: Test Compound Dose 1 NA2, etc. = Reflects the other dose level(s) A+C = Negative Chemical Control A-C = Activation: Solvent Control ACP = Activation: Positive Control ACT = Activation: Test Compound A+T = Activation: Tissue Control LI = Liver Tissue Activation Fraction LU = Lung Tissue Activation Fraction KI = Kidney Tissue Activation Fraction TE = Testes Tissue Activation Fraction 1,2, etc. = Dose Levels
CONCENTRATION	All test compound dose levels are expressed as a whole number followed by an exponent (negative) identified by the appropriate units. Example: 0025-2PCT = 0.25 percent concentration
POPU	Total number of viable cells in the plating sample raised to some exponent printed directly below the abbreviation (i.e., EP + 6 = X 10^6).
MUT 1	Total number of mutants or convertants obtained from the sample plated raised to some exponent printed directly below the abbreviation (i.e., EP + 0 = X 10^0). For strain D4, MUT 1 represents the number of ADE+ convertants.
MUT 2	Only used for strain D4 and represents the number of TRY+ convertants in the plated sample.
FREQ 1	The calculated mutation or gene conversion frequency times the negative exponent written directly below. For strain D4, FREQ 1 represents the ADE+ value.
FREQ 2	Only used for strain D4 and represents the TRY+ conversion frequency.
CONTAM	Presence of contamination on any plates.

DATA TABLE TERMS AND ABBREVIATIONS (continued)

ABBREVIATION OR TERM	DEFINITION OR EXPLANATION
AAF	2-Acetylaminofluorene
DMSO	Dimethylsulfoxide
DMN	Dimethylnitrosamine
EMS	Ethyl Methanesulfonate
QM	Quinacrine Mustard
NF	Nitrofluorene
SPECIES	Animal Strains
SPRDAW	Sprague Dawley Rats
ICRFLO	Flow ICR Random Bred Mice
RHESUS	Rhesus Monkey (Macaca mulatta)
MIXEDB	Dog, Mixed Breed
NEWZEA	New Zealand White Rabbit

LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
REPORT EXR34

COMPOUND FREQUENCY SUMMARY REPORT 04/25/75

SPECIES COMPOUND 001309484

TEST	ORG	TA1535 HIS EX-8	TA1537 HIS EX-8	TA1538 HIS EX-8	0000D4 ADE EX-5	0000D4 TRY EX-5
NAN		1.60	5.71	4.89	2.89	46.67
NAP		1158.63	73.09	200.22	24.55	77.84
NA1		2.42	1.71	5.03	2.13	13.62
NA2		11.44	1.16	3.88	2.34	18.70
REPEAT						
NAN		6.47				
NA2		5.62				

LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
REPORT EXR34

COMPOUND FREQUENCY SUMMARY REPORT 04/25/75

SPECIES ICRFLO COMPOUND 001309484

TEST	ORG	TA1535 HIS EX-8	TA1537 HIS EX-8	TA1537 HIS EX-8	TA1538 HIS EX-8	0000D4 ADE EX-5	0000D4 TRY EX-5
ACT	A+C	5.02	7.20		3.61	3.84	19.18
ACT	A+T	16.14	2.38		4.54	6.72	49.80
ACT	A-C	3.28	7.02	1.97	8.13	2.60	32.95
ACT	PLI	538.06	17.26		25.91	6.95	106.58
ACT	PLU	5.71	8.54		4.83	6.50	72.42
ACT	PTE	14.00	4.13		3.04	5.84	81.70
ACT	LI1	4.34	5.47		6.33	3.29	41.41
ACT	LI2	3.50	3.01		6.38	4.08	35.20
ACT	LU1	3.07	8.13		5.37	2.55	37.87
ACT	LU2	5.03	10.80		11.35	4.70	17.31
ACT	TE1	8.39	12.36		6.14	3.55	47.99
ACT	TE2	10.22	21.44	2.75	9.25	3.31	34.52

LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
REPORT EXR34

COMPOUND FREQUENCY SUMMARY REPORT 04/25/75

SPECIES SPRDAW COMPOUND 001309484

TEST	ORG	TA1535 HIS EX-8	TA1537 HIS EX-8	TA1538 HIS EX-8	0000D4 ADE EX-5	0000D4 TRY EX-5
ACT	A+C	1.61	5.41	1.64	3.41	3.32
ACT	A+T		2.25	1.70	1.11	1.01
ACT	A-C	1.49	3.04	1.65	2.45	3.15
ACT	PLI	19.21	11.93	13.62	6.67	10.95
ACT	PLU	2.07	1.90	1.49	1.75	3.06
ACT	PTE	3.56	2.84	1.74	2.17	2.96
ACT	LI1	1.16	4.79	1.88	2.23	3.35
ACT	LI2	5.88	3.68	2.02	1.67	2.94
ACT	LU1	1.45	8.43	1.74	1.43	3.86
ACT	LU2	1.54	3.44	1.77	1.16	3.22
ACT	TE1	1.59	7.66	1.72	1.06	1.97
ACT	TE2	2.38	7.31	1.91	1.75	1.98

LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
REPORT EXR34

COMPOUND FREQUENCY SUMMARY REPORT 04/25/75

SPECIES RHESUS COMPOUND 001309484

TEST	ORG	TA1535 HIS EX-8	TA1537 HIS EX-8	TA1538 HIS EX-8	TA1538 HIS EX-8	0000D4 ADE EX-5	0000D4 TRY EX-5
ACT	A+C	18.56	2.33	5.85		2.22	3.02
ACT	A+T	18.18	2.76	8.85		3.08	2.73
ACT	A-C	13.67	2.66	4.20	5.62	3.02	1.99
ACT	PLI	283.75	9.04	86.14		5.98	5.82
ACT	PLT	12.85	2.33	4.58		2.41	2.81
ACT	PTE	15.37	1.56	5.62		2.99	3.95
ACT	LI1	12.05	3.02	18.68	21.17	2.54	4.41
ACT	LI2	14.43	3.60	14.16	16.42	3.52	4.08
ACT	LU1	6.07	2.52	5.70		1.42	2.85
ACT	LU2	14.05	2.00	4.92		2.13	3.07
ACT	TE1	14.73	3.34	3.29		1.68	2.47
ACT	TE2	12.25	2.62	5.56		1.81	3.52

V. INTERPRETATION OF RESULTS AND CONCLUSIONS

Compound 001309484, Magnesium Oxide, was evaluated for genetic activity in a series of in vitro microbial assays with and without metabolic activation. The following results were obtained:

A. Salmonella typhimurium

1. Plate Tests

At a concentration of 0.05%, 001309484 was not mutagenic for the bacteria indicator organisms in either direct or activation plate tests.

2. Nonactivation suspension tests

The results of these tests were negative. The NA2 dose showed increased reversion with TA-1535, but a repeat of the test was negative.

3. Activation suspension tests

The results of the LI1 and LI2 doses with TA-1538 and primate tissues appeared to be positive and dose related. A repeat of the test resulted in similar responses. These doses did not produce positive responses with TA-1538 and mouse or rat tissues. The positive responses were relatively weak and may represent normal fluctutations.

B. Saccharomyces cerevisiae

1. Nonactivation suspension tests

The results of these tests were negative.

2. Activation suspension tests

The results of these tests were negative.

C. Conclusions

Compound 001309484, Magnesium Oxide, appeared to produce increased reversion of strain TA-1538 in the presence of primate liver tissue. No other tests with this chemical were positive. The positive results were relatively weak and may represent normal background fluctuations.

Because of the apparent genetic activity in the primate activation tests, the compound cannot be considered clearly nonmutagenic.

Submitted by:

David Brusick

David Brusick, Ph.D.
Director of Genetics

APPENDIX

Tabulation of Data

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 502802 DETECTOR TA1535 SPECIES DATE - 04/25/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	NAN		SALINE	0312	0005	1.60	0
	NAP		EMS 0.002 %	0394	4565	1158.63	0
001309484	NA1		0005-2 PCT.	0455	0011	2.42	2
001309484	NA2		0025-3 PCT.	0341	0039	11.44	0

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 504102 DETECTOR TA1537 SPECIES DATE - 04/25/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	NAN		SALINE	1435	0082	5.71	0
	NAP		QM 1.0 UG/ML	1293	0945	73.09	0
001309484	NA1		0005-2 PCT.	1460	0025	1.71	0
001309484	NA2		0025-3 PCT.	1727	0020	1.16	0

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 507802 DETECTOR TA1538 SPECIES DATE - 04/25/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	NAN		DMSO	0327	0016	4.89	0
	NAP		NF 125 UG-ML	0465	0931	200.22	0
001309484	NA1		0005-2 PCT.	0437	0022	5.03	0
001309484	NA2		0025-3 PCT.	0361	0014	3.88	0

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 504104 DETECTOR 0000D4 SPECIES DATE - 04/25/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+4	MUT1 EP+1	MUT2 EP+1	FREQ1 EP-5	FREQ2 EP-5	CONTAM
	NAN		SALINE	0450	0013	0210	2.89	46.67	4
	NAP		EMS 1.0 %	0501	0123	0390	25.44	77.84	6
001309484	NA1		0005-0 PCT.	0235	0005	0032	2.13	13.62	0
001309484	NA2		0025-1 PCT.	0385	0009	0072	2.34	18.70	0

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 503501 DETECTOR TA1535 SPECIES ICRFLO DATE - 04/25/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		DMN 50 UM/ML	0697	0035	5.02	0
	A+T		***NO MATCH***	0694	0112	16.14	0
	A-C		SALINE	0762	0025	3.28	0
	ACP	LI	DMN 50 UM/ML	0762	4100	538.06	0
	ACP	LU	DMN 50 UM/ML	0840	0048	5.71	0
	ACP	TE	DMN 50 UM/ML	0750	0105	14.00	0
001309484	ACT	LI1	0005-2 PCT.	0737	0032	4.34	0
001309484	ACT	LI2	0025-3 PCT.	0771	0027	3.50	1
001309484	ACT	LU1	0005-2 PCT.	1011	0031	3.07	2
001309484	ACT	LU2	0025-3 PCT.	0736	0037	5.03	2
001309484	ACT	TE1	0005-2 PCT.	0644	0054	8.39	0
001309484	ACT	TE2	0025-3 PCT.	0695	0071	10.22	1

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 503801 DETECTOR TA1537 SPECIES ICRFLO DATE - 04/25/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		AAF 800 UG/ML	1860	0134	7.20	0
	A+T		***NO MATCH***	3195	0076	2.38	0
	A-C		DMSO	1653	0116	7.02	0
	ACP	LI	AAF 800 UG/ML	2126	0367	17.26	0
	ACP	LU	AAF 800 UG/ML	0972	0083	8.54	2
	ACP	TE	AAF 800 UG/ML	1452	0060	4.13	0
001309484	ACT	LI1	0005-2 PCT.	1443	0079	5.47	0
001309484	ACT	LI2	0025-3 PCT.	1961	0059	3.01	0
001309484	ACT	LU1	0005-2 PCT.	0935	0076	8.13	2
001309484	ACT	LU2	0025-3 PCT.	0722	0078	10.80	2
001309484	ACT	TE1	0005-2 PCT.	1100	0136	12.36	0
001309484	ACT	TE2	0025-3 PCT.	0737	0158	21.44	0

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 506212 DETECTOR TA1537 SPECIES ICRFLO DATE - 04/25/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU MUT1 EP+6 EP+0	FREQ1 EP-8	CONTAM
	A-C		DMSO	1523 0030	1.97	0
001309484	ACT	TE2	0025-3 PCT.	1566 0043	2.75	2

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 503601 DETECTOR TA1538 SPECIES ICRFLO DATE - 04/25/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		AAF 800 UG/ML	0859	0031	3.61	0
	A+T		***NO MATCH***	1013	0046	4.54	0
	A-C		DMSO	0541	0044	8.13	0
	ACP	LI	AAF 800 UG/ML	0602	0156	25.91	0
	ACP	LU	AAF 800 UG/ML	0766	0037	4.83	0
	ACP	TE	AAF 800 UG/ML	1348	0041	3.04	2
001309484	ACT	LI1	0005-2 PCT.	0663	0042	6.33	0
001309484	ACT	LI2	0025-3 PCT.	0611	0039	6.38	0
001309484	ACT	LU1	0005-2 PCT.	0708	0038	5.37	0
001309484	ACT	LU2	0025-3 PCT.	0379	0043	11.35	0
001309484	ACT	TE1	0005-2 PCT.	0684	0042	6.14	0
001309484	ACT	TE2	0025-3 PCT.	0454	0042	9.25	2

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 503701 DETECTOR 0000D4 SPECIES ICRFLO DATE - 04/25/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+4	MUT1 EP+1	MUT2 EP+1	FREQ1 EP-5	FREQ2 EP-5	CONTAM
	A+C		DMN 90 UM/ML	0417	0016	0080	3.84	19.18	5
	A+T		***NO MATCH***	0506	0034	0252	6.72	49.80	4
	A-C		SALINE	0346	0009	0114	2.60	32.95	0
	ACP	LI	DMN 90 UM/ML	0532	0037	0567	6.95	106.58	0
	ACP	LU	DMN 90 UM/ML	0446	0029	0323	6.50	72.42	6
	ACP	TE	DMN 90 UM/ML	0377	0022	0308	5.84	81.70	0
001309484	ACT	LI1	0005-0 PCT.	0425	0014	0176	3.29	41.41	0
001309484	ACT	LI2	0025-1 PCT.	0588	0024	0207	4.08	35.20	5
001309484	ACT	LU1	0005-0 PCT.	0470	0012	0178	2.55	37.87	0
001309484	ACT	LU2	0025-1 PCT.	0468	0022	0081	4.70	17.31	1
001309484	ACT	TE1	0005-0 PCT.	0423	0015	0203	3.55	47.99	0
001309484	ACT	TE2	0025-1 PCT.	0423	0014	0146	3.31	34.52	0

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 502801 DETECTOR TA1535 SPECIES SPRDAW DATE - 04/25/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		DMN 50 UM/ML	0496	0008	1.61	0
	A-C		SALINE	0941	0014	1.49	0
	ACP	LI	DMN 50 UM/ML	0229	0044	19.21	2
	ACP	LU	DMN 50 UM/ML	0242	0005	2.07	0
	ACP	TE	DMN 50 UM/ML	0281	0010	3.56	2
001309484	ACT	LI1	0005-2 PCT.	0602	0007	1.16	0
001309484	ACT	LI2	0025-3 PCT.	0697	0041	5.88	0
001309484	ACT	LU1	0005-2 PCT.	0689	0010	1.45	0
001309484	ACT	LU2	0025-3 PCT.	0977	0015	1.54	2
001309484	ACT	TE1	0005-2 PCT.	0566	0009	1.59	0
001309484	ACT	TE2	0025-3 PCT.	0797	0019	2.38	2

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 504501 DETECTOR TA1537 SPECIES SPRDAW DATE - 04/25/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		AAF 800 UG/ML	1219	0066	5.41	0
	A+T		***NO MATCH***	1245	0028	2.25	0
	A-C		DMSO	1448	0044	3.04	0
	ACP	LI	AAF 800 UG/ML	0989	0118	11.93	0
	ACP	LU	AAF 800 UG/ML	1319	0025	1.90	0
	ACP	TE	AAF 800 UG/ML	0952	0027	2.84	2
001309484	ACT	LI1	0005-2 PCT.	1044	0050	4.79	3
001309484	ACT	LI2	0025-3 PCT.	1088	0040	3.68	3
001309484	ACT	LU1	0005-2 PCT.	1067	0090	8.43	1
001309484	ACT	LU2	0025-3 PCT.	1076	0037	3.44	3
001309484	ACT	TE1	0005-2 PCT.	0992	0076	7.66	3
001309484	ACT	TE2	0025-3 PCT.	1053	0077	7.31	2

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 504301 DETECTOR TA1538 SPECIES SPRDAW DATE - 04/25/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		AAF 800 UG/ML	3528	0058	1.64	0
	A+T		***NO MATCH***	4002	0068	1.70	0
	A-C		DMSO	3028	0050	1.65	0
	ACP	LI	AAF 800 UG/ML	2158	0294	13.62	0
	ACP	LU	AAF 800 UG/ML	3414	0051	1.49	0
	ACP	TE	AAF 800 UG/ML	4136	0072	1.74	0
001309484	ACT	LI1	0005-2 PCT.	2186	0041	1.88	3
001309484	ACT	LI2	0025-3 PCT.	2520	0051	2.02	0
001309484	ACT	LU1	0005-2 PCT.	2587	0045	1.74	0
001309484	ACT	LU2	0025-3 PCT.	2372	0042	1.77	0
001309484	ACT	TE1	0005-2 PCT.	2618	0045	1.72	2
001309484	ACT	TE2	0025-3 PCT.	2832	0054	1.91	0

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 504401 DETECTOR 0000D4 SPECIES SPRDAW DATE - 04/25/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+4	MUT1 EP+1	MUT2 EP+1	FREQ1 EP-5	FREQ2 EP-5	CONTAM
	A+C		DMN 90 UM/ML	1085	0037	0036	3.41	3.32	0
	A+T		***NO MATCH***	4064	0045	0041	1.11	1.01	0
	A-C		SALINE	1144	0028	0036	2.45	3.15	0
	ACP	LI	DMN 90 UM/ML	1005	0067	0110	6.67	10.95	0
	ACP	LU	DMN 90 UM/ML	1142	0020	0035	1.75	3.06	0
	ACP	TE	DMN 90 UM/ML	1150	0025	0034	2.17	2.96	0
001309484	ACT	LI1	0005-0 PCT.	0896	0020	0030	2.23	3.35	0
001309484	ACT	LI2	0025-1 PCT.	1020	0017	0030	1.67	2.94	0
001309484	ACT	LU1	0005-0 PCT.	0906	0013	0035	1.43	3.86	0
001309484	ACT	LU2	0025-1 PCT.	1119	0013	0036	1.16	3.22	2
001309484	ACT	TE1	0005-0 PCT.	0660	0007	0013	1.06	1.97	0
001309484	ACT	TE2	0025-1 PCT.	0857	0015	0017	1.75	1.98	0

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 504901 DETECTOR TA1535 SPECIES RHESUS DATE - 04/25/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		DMN 50 UM/ML	1546	0287	18.56	0
	A+T		***NO MATCH***	2718	0494	18.18	0
	A-C		SALINE	2187	0299	13.67	0
	ACP	LI	DMN 50 UM/ML	2080	5902	283.75	0
	ACP	LU	DMN 50 UM/ML	1666	0214	12.85	0
	ACP	TE	DMN 50 UM/ML	1971	0303	15.37	0
001309484	ACT	LI1	0005-2 PCT.	2449	0295	12.05	0
001309484	ACT	LI2	0025-3 PCT.	2100	0303	14.43	0
001309484	ACT	LU1	0005-2 PCT.	3576	0217	6.07	0
001309484	ACT	LU2	0025-3 PCT.	2242	0315	14.05	0
001309484	ACT	TE1	0005-2 PCT.	2152	0317	14.73	0
001309484	ACT	TE2	0025-3 PCT.	2171	0266	12.25	2

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 505001 DETECTOR TA1537 SPECIES RHESUS DATE - 04/25/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		AAF 800 UG/ML	2665	0062	2.33	0
	A+T		***NO MATCH***	3079	0085	2.76	0
	A-C		DMSO	2597	0069	2.66	0
	ACP	LI	AAF 800 UG/ML	2899	0262	9.04	0
	ACP	LU	AAF 800 UG/ML	2577	0060	2.33	0
	ACP	TE	AAF 800 UG/ML	3459	0054	1.56	2
001309484	ACT	LI1	0005-2 PCT.	1720	0052	3.02	0
001309484	ACT	LI2	0025-3 PCT.	2053	0074	3.60	0
001309484	ACT	LU1	0005-2 PCT.	1981	0050	2.52	0
001309484	ACT	LU2	0025-3 PCT.	2606	0052	2.00	0
001309484	ACT	TE1	0005-2 PCT.	1826	0061	3.34	0
001309484	ACT	TE2	0025-3 PCT.	1981	0052	2.62	0

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 505101 DETECTOR TA1538 SPECIES RHESUS DATE - 04/25/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		AAF 800 UG/ML	0855	0050	5.85	0
	A+T		***NO MATCH***	0599	0053	8.85	0
	A-C		DMSO	0834	0035	4.20	0
	ACP	LI	AAF 800 UG/ML	0866	0746	86.14	0
	ACP	LU	AAF 800 UG/ML	0896	0041	4.58	0
	ACP	TE	AAF 800 UG/ML	0836	0047	5.62	0
001309484	ACT	LI1	0005-2 PCT.	0273	0051	18.68	0
001309484	ACT	LI2	0025-3 PCT.	0353	0050	14.16	0
001309484	ACT	LU1	0005-2 PCT.	0509	0029	5.70	0
001309484	ACT	LU2	0025-3 PCT.	0447	0022	4.92	0
001309484	ACT	TE1	0005-2 PCT.	0607	0020	3.29	0
001309484	ACT	TE2	0025-3 PCT.	0629	0035	5.56	0

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 506209 DETECTOR TA1538 SPECIES RHESUS DATE - 04/25/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A-C		DMSO	0427	0024	5.62	0
001309484	ACT	LI1	0005-2 PCT.	0222	0047	21.17	0
001309484	ACT	LI2	0025-3 PCT.	0268	0044	16.42	0

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 504802 DETECTOR 0000D4 SPECIES RHESUS DATE - 04/25/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+4	MUT1 EP+1	MUT2 EP+1	FREQ1 EP-5	FREQ2 EP-5	CONTAM
	A+C		DMN 90 UM/ML	1127	0025	0034	2.22	3.02	0
	A+T		***NO MATCH***	1427	0044	0039	3.08	2.73	0
	A-C		SALINE	1257	0038	0025	3.02	1.99	0
	ACP	LI	DMN 90 UM/ML	1322	0079	0077	5.98	5.82	0
	ACP	LU	DMN 90 UM/ML	1493	0036	0042	2.41	2.81	0
	ACP	TE	DMN 90 UM/ML	1139	0034	0045	2.99	3.95	0
001309484	ACT	LI1	0005-0 PCT.	1180	0030	0052	2.54	4.41	0
001309484	ACT	LI2	0025-1 PCT.	0711	0025	0029	3.52	4.08	1
001309484	ACT	LU1	0005-0 PCT.	0772	0011	0022	1.42	2.85	3
001309484	ACT	LU2	0025-1 PCT.	0846	0018	0026	2.13	3.07	1
001309484	ACT	TE1	0005-0 PCT.	1134	0019	0028	1.68	2.47	5
001309484	ACT	TE2	0025-1 PCT.	0994	0018	0035	1.81	3.52	0